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ABSTRACT

A newsletter addresses the issues school administrators should consider in planning and implementing the use of microcomputers in their schools. Described are ways in which microcomputers will change management, the variety of ways computers can be used in educational administration, classroom activities using computer-based instruction, criteria for software evaluation, and the role of the principal in coordinating computer implementation. The latter section considers the three issues of budgeting, staffing, and training. A case study is provided. (LP)

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Managing Microcomputers: What the Principal Needs to Consider

October 1983

The Practitioner

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THE PRACTITIONER

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Managing Microcomputers:

What the Principal Needs To Consider

The truck any day now will be pulling up to the front door of your school with a load of microcomputers.

Where are you going to put them? In a single location or scattered throughout the building? Do you need some special facilities?

Who will operate them? A few people or virtually everyone? How will they be trained? What will they be taught?

Will you develop your own software? Or, will you buy some? How are you going to select the software that is best for your needs?

What do you want the microcomputers to do? Guidance? Athletics? Instruction? Assessment? Are some things better left to pencil and paper?

Finally, what are the budget implications?

This issue of The Practitioner will provide some basic information, as well as some tips and resources, for answering the many questions involved in planning and implementing the use of micros in your school.

There are many educational uses for microcomputer technology. Micros can deliver instruction to students (computer-assisted instruction), and provide enhanced capabilities in such areas as attendance, scheduling, word processing, and accounting (administrative uses). Micros may be the subject of instruction (computer literacy), or they may support teachers in their efforts to provide effective instruction (computer-managed instruction).

With the advantages, however, comes the responsibility for effective planning and implementation, maintenance, security, and balancing need for quality with equity of access. You can expect that the installation of computers in your school will have a greater effect than most other new efforts of equal cost. Further, the change must be achieved against the backdrop of the school community's expectations. Anticipating the "change

factor" and managing it with an understanding of purpose, impact, and direction is of the highest priority.

Getting Started with Micros: Planning

The first step in planning for microcomputers has little to do with computers at all. Before looking at computer hardware and software, spend some time--perhaps a good bit of time--thinking about your school and what you want to do. FOR BEST RESULTS, YOU WILL NEED TO DECIDE IN A VERY SYSTEMATIC WAY WHAT YOU WANT TO USE MICROCOMPUTERS FOR, WHAT SOFTWARE WILL HELP YOU MEET THOSE OBJECTIVES, AND WHAT HARDWARE WILL RUN THE SOFTWARE. Here are some tips about this process.

- ✓ Decide on the level of implementation you want. Do you want microcomputers in several classrooms; for a few administrative tasks; in a department; in a building; or for implementation across an entire district?
- ✓ Once you have decided on the scope of your effort, do an audit. Carefully describe how the tasks are carried out now, what kinds of management decisions are involved, and what kinds of information are collected and used.
- ✓ Use the audit information to initiate dialog among those who will be involved in using the micros. Verify the audit findings with them.
- ✓ Analyze your plans carefully in terms of how computers can help. Verify this analysis with the district, a commercial vendor, or a private consultant.
- ✓ What's the hurry? Establish a reasonable time frame for implementation. Chances are you have done well for years without micros. Competing with other schools or trying to respond to newly imposed expectations is not likely to enhance your program. Pacing program development with broad-based input and careful decision making will generate the specifications for a system that will meet your needs.

Research suggests that it is critical to establish ownership among those who will use the microcomputers. Without this kind of involvement, implementation will be difficult. Representative input from clerical staff and parents as well as teachers is important. A number of good ideas to encourage involvement have emerged from different implementation efforts.

1. Some schools have found that a task force with a knowledgeable leader and the use of outside resources is an effective approach.
2. A flexible system can best meet changing needs. Identify your immediate needs, but keep an eye on the future.

3. Staff awareness about computer technology should be an early and continuing inservice concern. An adequate knowledge base must be established before much planning can be carried out. A team approach to training will fortify staff ownership.
4. Start small, at least as a general rule. Use short, intermediate, and long-range goals to pace your efforts. Plan to expand only as you gain experience at each level of implementation. Short-term goals are basic to success.

If you have a computer whiz on staff, you are fortunate. Most administrators do not. Knowledge about hardware, software, and instructional applications, however, is absolutely essential. How can you obtain the needed expertise? Some of the alternatives are:

- Hiring an outside consultant;
- Training a person who is already in your building or district;
- Teaming consultants and local staff on a long-term basis to coordinate the development and to train your staff;
- Collaborating with a vendor or with university personnel;
- Forming a consortium with other school administrators to share ideas and combine resources.

Anticipating the Issues of Implementation

A number of issues must be faced when a school develops a plan for introducing the use of computers. If these issues are neglected, unnecessary difficulties may arise.

■ The first set of issues deals with human concerns. Since the introduction of micros into a school will affect most of the professional staff, most of these people should be involved in the development of an implementation plan. Professional staff members will need technical training in the required knowledge and skills, as well as time to practice the skills. Community members must be alerted and involved.

■ The second set of questions involves curriculum and instruction issues. The introduction of computers into the instructional program will directly affect the processes of teaching and learning. Your plan must address the following questions:

- ✓ Where in the curriculum will it be most appropriate to offer computer literacy instruction?

- ✓ Will the computer be used to support regular instruction (drill and practice, computer-assisted instruction), to provide computer content (computer science, languages, programming), to manage instruction, or some combination of these?
- ✓ How will software and courseware be evaluated, selected, and integrated into the computer curriculum or the content area?
- ✓ What central office assistance will be available for implementing the program?
- ✓ Will the selection of hardware be based on budget, policy, or available software? Who decides?
- ✓ What model will work best for evaluation?
- ✓ What will be your response to emerging curriculum expectations--i.e., advanced programming, robotics, electronics, artificial intelligence, pre-engineering, etc.?

■ Management concerns comprise the third set of issues. Computers will affect the fiscal resources of the district. Your plan must determine where the fiscal resources will come from, how the available fiscal and human resources will be allocated to the program, and what fiscal constraints will affect the program, particularly at future stages.

District policies and procedures regulating staffing, selection of instructional materials, collection and storage of confidential information, and any interface with the district or county mainframe computer will be affected.

Anticipating the effects of implementation will place constraints in perspective, heighten confidence, and yield a satisfactory return on the time and commitment of the school staff.

Using the Computer as a School Management Tool

The use of microcomputers in the management of a school represents a fundamental change in the way schools operate. Microcomputer programs allow the administrative team to manipulate large amounts of information easily and efficiently. A data-based management system, for example, allows you to:

- Create personalized forms;
- Sort and sequence records in a file;
- Update individual records;
- Store and retrieve information according to specifications that you define;

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- Print desired information in variable formats.

Information can be updated at any time. Outdated information can be deleted from the system without deleting the record. Information can be resorted, resequenced, or reindexed according to selected descriptors.

Although overlap occurs, two forms of computer management can be used in the school: administrative management and instructional management.

■ Administrative uses of microcomputers can be classified under five functions:

1. Information management (data base management) comprises such tasks as keeping school attendance records, generating grade reports, making inventory lists, scheduling the school, and maintaining permanent student records.
2. Financial management (spread sheet applications) includes budget projections, student activity accounting, and school accounting.
3. Word processing is used for such things as developing manuals and handbooks, maintaining mailing lists, and producing form letters.
4. Telecommunications involves connections with remote computers via telephone (modem).
5. Graphics capabilities are not highly developed for school administrative use at this time, but can be very useful for displaying data and running simulations to support decision making.

■ Computer based instruction (CBI) includes both computer-assisted and computer-managed varieties. Computer-assisted instruction (CAI) is used primarily for tutorial instruction in subject content. Computer-managed instruction (CMI) uses the microcomputer to format, track, and update information for the following activities:

1. Assigning learning objectives--Many instructional programs are based on goals and objectives. Objectives may be linked to short segments of instruction (lessons or units), to larger segments (courses), or to graduation or grade level competencies.
2. Grouping students for instruction--Students are grouped at various times according to grade levels, interests, or achievement. Placing students in courses or classes--scheduling--is the most common form of grouping. Grouping within classes is also common in middle level schools.
3. Prescribing instruction--Teachers match assignments to groups and individuals. Assignments may vary in content, length, and level of difficulty. The types of materials and activities prescribed may vary, even on the same topic. Good instructional

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prescriptions match the objectives of the lesson with the academic skills and learning style characteristics of the learner.

4. Testing--Prior to instruction, it is useful to know a student's level of academic knowledge/skill both to decide on objectives (diagnosis) and to plan learning activities (prescription). After instruction, achievement must be assessed. Assessment involves several management tasks. An instrument, often a test, must be developed, perhaps with items from an item bank. The test must be presented to the student in some form, on paper, orally, or through the video display of a microcomputer. After the student has responded to the items, the test must be scored and the scores summarized in some way.
5. Recording progress--Teachers accumulate many kinds of information about students: test scores, observational data, the products of daily assignments. These performance data are the basis for a number of decisions. Accordingly, the information must be organized in a way that facilitates decision making.
6. Reporting performance--To support good decisions, information must be reported selectively and systematically to teachers, parents, and students. The usual vehicle is the letter-grade report card. An alternative approach is the individual performance profile which link objectives to performance levels (such as mastery criteria). Information must be managed --retrieved and summarized--so that the reports are accurate representations of the learning experiences.
7. Reviewing program effectiveness--Increasing emphasis is being placed on student performance data in the review of instructional programs. The goal of program evaluation is to continuously improve the effectiveness of classroom instruction. To achieve this end, teachers need various kinds of summary data about student progress; e.g., achievement data can be analyzed statistically and compared with objectives; group performance on individual test items can be examined to spot poor items or areas where instruction must be improved.

Selecting Software for Management Tasks

Software refers to computer programs--sequences of instruction usually found on a diskette or disk--that cause a computer to carry out desired functions. Software commands control the various hardware components of a computer. The commands initiate procedures for carrying out the specific tasks and functions of the program. The software with documents and procedures necessary for an application is called a package or system.

Software packages can be made usable for specific applications in several ways:

1. Hire a programmer and have a custom program written to match your local needs.
2. Buy a commercially available program and use what it offers by adapting your procedures to the program.
3. Buy a commercially available program, hire a programmer, and have the program modified to meet your needs.

All three approaches appear to work, the critical variables being available time, money, and programming competence.

A considerable amount of microcomputer software exists that can be used with little or no adaptation. This software is of two basic types.

- "Generic" software is usable in many different kinds of applications and therefore is quite cost effective. Three general application (generic) packages are in wide use: data base management (an electronic file cabinet); spread sheets (e.g., VisiCalc or SuperCalc); and word processing. The same spread sheet application, for example, can be used to maintain an inventory of textbooks, bus transportation information, and records of attendance. Indeed, generic software can be customized to meet specific and unique needs of individual schools and districts.
- Applied software is developed for a specific audience and type of application. "Balance Your Checkbook," "Scheduling," and "Attendance" packages are examples. Since each is designed for only a single application, its features are uniquely suited to perform the task thoroughly and completely. Applied software can be used immediately and, if the documentation is well designed, with considerable effectiveness.

A Guide To Decide

The following elements of a software package should be carefully examined: available documentation, inputs and operations, output products, and usability.

1. Look at the DOCUMENTATION--some or all of the following should be available:

- An index
- Table of contents
- A "help" section explaining what to do when you are stuck, lost, or confounded
- System overview
- Illustration of various video screen displays
- Sample reports
- Information on basic hardware and available options
- A description of the system and its file capacities (to determine whether the program will accommodate your school population)

The printed documentation of a software package should provide the necessary assistance to make the program easy to use. Documentation display and report examples should be consistent in their terminology and format and written in clear, straightforward language. In particular, look for examples in the documentation that are relevant to your expected use.

2. Several criteria should be applied to the INPUTS and OPERATIONS features of a software package.

- ✓ Check whether the allowable sizes of the input fields are spelled out. Are the capacities of the system and number of individual files suitable for your intended uses? Many packages display a message on the screen when maximum file capacity is approaching.
- ✓ A good software package permits only acceptable data to be entered; it has "error trapping" capabilities. Inadequate error trapping can mean that a wrong keystroke will freeze your screen, lock your program, or require drastic measures such as reloading the operating system program ("re-booting") and/or re-entering all the data. To thoroughly test error handling capabilities, become familiar enough with a package to deliberately make practical errors. Then address the question, "Does this software handle these kinds of errors satisfactorily for our kind of application?"
- ✓ If the package consists of several modules, data entry procedures should be consistent from module to module. Look for displays that provide adequate instructions and "prompts" to the user about entering data correctly into the system.
- ✓ The package should be menu-driven; that is, use of the program should only require the operator to make choices from a "menu," not have programmer's skills. An important option of the menu should be the capacity to copy data files, with easy or automatic return to the menu. Also determine if the program runs at an acceptable speed.
- ✓ Question the dealer, vendor, or manufacturer about policy on back-up (extra) copies of the software and what kind of support you will receive (response time) in a problem situation. Also, can multiple copies of the program be made at low cost for other micros in the school?

3. Next look at the OUTPUTS of the software package. The outputs should be appropriate for the purpose of the program and be available both on the video display and in hard copy version. The screen displays should be easy to read, with meaningful abbreviations, adequate spacing, and legible print. The printouts should be easy to read and to use.

A word about printers: You need one. A computer system without a printer is like a new car up on blocks. Seek professional advice in buying a printer based on whether you want letter quality, high speed, high resolution, etc., and how much use you expect. And while you can rely on others to

recommend an adequate printer, you must test the software print functions in terms of easy access, stop printing, formatting, and making changes.

4. In your overall assessment and final analysis of a software package, there are six general usability factors to consider before making a decision:

- ✓ Is the package easy to install and use, especially in dealing with keystroke errors?
- ✓ Does the package make effective use of the computer, i.e., does it provide real advantages over manual methods?
- ✓ Is the program flexible and adjustable to specifically defined needs?
- ✓ Is the program reliable? Has it been carefully "debugged"?
- ✓ Does the program provide for protection against casual access to confidential data?
- ✓ Is manufacturer/dealer support consistent with local expectations for use (the greater the use, the more need for help/service)?

Managing Implementation: A Leadership Issue

Assuming you planned well and selected appropriate, quality software, you still have the challenge of managing the use of microcomputers in your school. There are several areas to consider: budget, staffing, and training.

■ Let's begin with the budget, an aspect of computer implementation which, if overlooked, can seriously undermine a school plan. An initial consideration is consultant cost for planning and trouble-shooting. Occasionally problems arise with specific application software that require advice or additional assistance. Much time and effort can be saved by consulting an outside specialist. Establishing a line item in the program budget will prevent or minimize planning decisions that might otherwise become bureaucratic headaches. Other frequently overlooked (or underbudgeted) costs are:

- Hardware maintenance;
- Computer supplies, diskettes, paper;
- Staff training.

■ There are many models for microcomputer staffing, but individual schools have found that maximum and lasting impact can be achieved if the program is under the supervision of a computer coordinator who:

- Serves the identified needs of teachers and students;
- Operates a computer lab as a regular teaching responsibility;
- Is compensated with extended responsibility pay in proportion to the extra work.

■ The principal must lead the way for staff training by acquiring at least minimal computer skills and demonstrating support for teachers who seek training. Professional trainers will be needed. Staff members can be grouped for training by level of skill. And those having skills can assist those who have none.

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Staff members should be trained only in computer techniques of practical educational value. Training should be encouraged, but should remain optional. Computers should be easily accessible for practice.

REMEMBER THE BASICS. Decide what you want to do with computers. Locate the most suitable software package. Acquire the hardware capable of running the software.

To Illustrate

Administrators must deal with the many facets of managing microcomputers in their schools. The examples below emphasize particular elements for illustrative purposes rather than describe the full range of microcomputer activities underway in schools.

DEVELOPING STAFF AND SOFTWARE



Jefferson High School
Nate Jones, Principal
Glen Hampshire, Director of Computer Science

5210 N. Kerby Ave.
Portland, Oreg. 97217

The widespread use of computers in a variety of applications--word processing, attendance reporting, guidance, instruction--demands a staff that is computer literate. Four years ago, 24 Jefferson High School teachers received their first training on a time-share system. Now 54 percent of the 130 professional staff members are computer literate. More than 300 other teachers from Portland and nearby districts have completed training at Jefferson during the past three years, with arrangements made by the Multnomah County Education Service District.

When Jefferson opened training to the community on Saturday mornings (made possible in part by a \$20,000 Ford Foundation grant), the maximum 48 people signed up and more had to be turned away.



Lyons Township High School
Estella Gahala, District Director
of Curriculum and Instruction

100 S. Brainard Ave.
La Grange, Ill. 60525

The Lyons Township High School District #204 embarked on a flexible plan of computer literacy by identifying student objectives. These objectives in turn defined the teacher training program.

An outside consultant trained eight teachers, who trained 35 others, who in turn trained the remaining 240 teachers. Noncertificated staff were offered the option of training at each phase. Teachers received 20 hours of training during a 15-month period on computer awareness, general knowledge, specific content, demonstration, practice, and feedback. An unlimited amount of coaching from peers was available to individual teachers after formal training was completed.

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Summer workshops provided time for teachers and programers to develop curriculum software for use in subject-related courses. Lyons recommends that programing time be carefully estimated based on the difficulty of the job, and not on a flat hourly rate.



Bridger School District
Carl Fox, Vice Principal

429 W. Park Ave.
Bridger, Mont. 59014

When the Bridger School District, with only 317 students in grades K-12, decided to use microcomputers for administrative tasks in 1978, appropriate software simply did not exist. Bridger began developing its own. Now 23 other districts in Montana use portions of the software developed by the district for budgeting, payroll, athletic accounting, salary projection, student attendance, student scheduling, inventory, basketball statistics, test development, etc.

Bridger's advice today: Look for available software first. It is not usually advisable to develop your own.

COMPUTER-MANAGED INSTRUCTION



Wrangell City School District
Kathy Wayne, Computer Center Coordinator

Box 651
Wrangell, Alaska 99929

The elementary and secondary schools of Wrangell, a small town isolated on an island in southeastern Alaska, initiated the computer-managed instruction program called CAM (Comprehensive Achievement Monitoring) after visiting Hopkins, Minn., where it was originally developed.

A set of objectives was developed or located for each course, and test items were prepared for each objective, creating an item bank for the course. The item bank permits test forms covering a broad range of course objectives to be developed and utilized. Tests are administered at the start of a course and at two-four week intervals. CAM information is intended to help teachers decide what content to emphasize, what things to cover early, which students need remedial help, and what important concepts or skills need reteaching.

Space has been set aside in each school for an Evaluation Center where an aide makes computer entries, maintains the test item bank, compiles tests, and generates most of the reports and records.



Duluth School District
Donna Mark, Coordinator

800 E. Central Entrance
Duluth, Minn. 55811

Two fundamental skill areas--reading and math--receive special attention at Washington Junior High and Central High School in Duluth. Called the Basic Skills Development Design, the program incorporates criterion referenced testing, grouping, and a monitoring system that allows skill development to be tracked across classes and grade levels.

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Using a formal scope and sequence in reading and math, Duluth staff developed minimum proficiency tests for each subject, units of instruction keyed to objectives, and a computer-based record keeping system.

Data security is a priority, and frequent system monitoring provides a basis for program modification.



McMinnville School District
Jens J. Robinson, Superintendent
John Lewis, Computer Coordinator

1500 N. Baker St.
McMinnville, Oreg. 97128

McMinnville School District for less than \$10,000 is operating a unique pilot project that preprints scannable answer forms for any test a teacher wishes to use, and provides the teacher with a printout of the results.

The tests are drawn from published texts or are teacher-made. A key with the correct responses must be available. The program permits the teacher to subdivide the test into separately scored sections. In addition to the printout report for each student and the class, the program provides an item analysis to help teachers decide whether the students need additional instruction on a particular concept or skill.



Los Gatos High School
Los Gatos, Calif. 95030
Fred Keplinger, Coordinator

Saratoga High School
Saratoga, Calif. 95070
Marion Kenworthy, Coordinator

The nearly 4,000 high school students in Los Gatos must demonstrate competence in basic skills as a prerequisite to graduation. Tests have been developed to assess proficiency in eleven math, reading, and writing competencies. Students must establish competence in each objective through four 1-hour tests. The tests are first administered in ninth grade and offered subsequently three times a year.

Tests are automatically scored and results entered in each student's computer file. Information stored in the computer is manipulated several ways to produce reports useful to students, teachers, and administrators. Reports describe the progress of individuals (nonmastered competencies, status of all competencies, results of all tests administered) and of groups (class/grade status, school status, all students not mastering a specific competency). Administrators receive statistically oriented school status reports which are used in planning for program review and revision.

This Practitioner was prepared by Michael Grice, Donald C. Holznagel, and Jerry Kirkpatrick of the Instructional Improvement Division, Computer Technology Program, Northwest Regional Educational Laboratory, Portland, Oregon.

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